



**PATENT APPLICATION**

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re application of

Docket No: Q67868

Kenichi ISO, et al.

Appln. No.: 10033,918

Group Art Unit: 1764

Confirmation No.: Z 91

Examiner: Ellen M. MCAVOY

Filed: January 03, 2002

For: ROLLING BEARING

**DECLARATION UNDER 37 C.F.R. § 1.132**

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Sir:

I, Kenichi Iso, hereby declare and state:

THAT I am a citizen of Japan;

THAT I have been employed by NSK LTD since 1992, where I have been engaged in the research and development of grease for rolling bearings of automobile engine accessories from 1992 to the present date;

THAT I am a co-inventor of the invention described and claimed in the above-identified application;

THAT I am familiar with the prosecution of the above-captioned application; and

THAT the experimentation set forth below was conducted by me or under my direct supervision.

### EXPERIMENTATION

Four grease compositions were prepared and evaluated as shown in Table 1 below.

Examples 1 to 3 are grease compositions of the invention, containing one or both of Zn naphthenate and succinic acid ester as a rust-preventive agent. Comparative Example 1 contained Ba sulfonate which is a conventional rust-preventive agent. Each of the grease compositions is within the scope of claim 1 of U.S. Patent 5,282,689 to Imamura et al. Each of the grease compositions was evaluated with respect to flake generation and rust prevention as described below.

Table 1 Supplement of Examples and Comparative Example

		Ex. 1	Ex. 2	Ex. 3	Comp. Ex. 1 <sup>*1</sup>
Thickener		Diurea Compound			
Amount of Thickener		20 %			
Base Oil		Ether-based Synthetic Oil			
Base Oil Kinematic Viscosity mm <sup>2</sup> /sec, 40°C		100			
Rust- Preventive Agent	Zn Naphthenate	2 %	-	2 %	-
	Succinic Acid Ester	-	2 %	2 %	-
	Ba Sulfonate	-	-	-	2 %
Flaking Test Result		0 %	0 %	0 %	75 %
Rust Prevention Test Result		0	0	0	0

Note: <sup>\*1</sup>: Comparative Example 1 is within the scope of claim 1 of Imamura et al.

<sup>\*2</sup>: Imamura et al. is silent about additives in the composition. The flaking life may vary depending upon the selection of additives.

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<Flaking Test Condition>

Flaking generation ratio (%) = (number of tests resulting in flake generation/total number of tests)  $\times$  100

The flaking life of each of the Examples was evaluated by quickly accelerating and decelerating a bearing assembled in an alternator, by an engine. That is, a single row deep groove ball bearing (inner diameter  $\phi$ 17 mm, outer diameter  $\phi$ 47 mm, width 14 mm) packed with 2.36 g of each of the above-mentioned greases was assembled in an alternator for executing a test by continuously rotating the bearing in a 1,000 to 6,000 rpm engine rotational frequency (bearing rotational frequency 2,400 to 13,300 rpm) repetition, at room temperature, and a 1,764Nf pulley load condition for a 500 hour target time. Moreover, when flaking was generated on the bearing outer race running surface so as to cause vibration, the test was concluded. The test was conducted 4 times for each condition.

<Rust Prevention Test Condition>

A deep groove ball bearing having a  $\phi$ 17 mm inner diameter, a  $\phi$ 47 mm outer diameter, and a 14 mm width having a round contact rubber seal, packed with 2.3 g of each of the above-mentioned greases was rotated at 1,800 rpm for one minute. After the rotation, 0.5 ml of a 0.5% by mass salt water was injected into the bearing, and it was rotated at 1,800 rpm for one minute. After standing for 120 hours in a 60°C, 100% RH condition, the rust generation state on the inner and outer raceway surface of the tested bearing was observed. According to the evaluation standard shown in Table 2, a rust generation state of 2 or less was judged to be passing.

Table 2 Rust Generation State

Rust evaluation point	Rust state
0	without rust
1	stain rust
2	spot rust
3	small rust
4	middle rust
5	large rust

By packing the grease of Examples 1, 2 and 3 according to the present invention, containing at least one of the naphthenate and the succinic acid derivative as the rust-preventive additive, generation of both rust and flaking in the bearing can be restrained. In contrast, although the rust generation was not observed in Comparative Example 1, flaking was generated with use of Ba sulfonate as a conventional rust-preventive addition.

The above-noted results are unexpectedly superior over the prior art relied upon by the Examiner.

I declare further that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Date: 3.10.2003

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